THE JOINT EXAMINATION BOARD

PAPER P6

INFRINGEMENT AND VALIDITY OF UNITED KINGDOM PATENTS

5TH NOVEMBER 1997

10.00 a.m. – 2.00 p.m.

Please read the following instructions carefully. This is a **four hour** paper.

1. Write on one side of the paper only using **black or dark blue** ink. You must write your examination number and designation of the paper in the top right hand corner of each sheet. You must not state your name anywhere in the answer.

2. **No** printed matter or other written material may be taken into the examination room.

3. Answers **must** be legible. If the examiners cannot read a candidate's answer no marks will be awarded.

4. Candidates are reminded that marks are awarded more for the points selected for discussion and the reasoning displayed than conclusions reached.

Document checklist:-

Client's letter – 2 pages

Document A - Client's Patent - 4 pages description, 1 page claims, 1 sheet drawings

Document B - Extract from D-I-Y News - 2 pages description, 1 sheet drawings

Document C - Extract European Patent A1 300 000 - 2 pages description, 1 sheet drawings

Document D – United States Patent 4,000,000 – 3 pages description, 1 sheet drawings

Document E – Canadian Technical Leaflet – 2 pages description, 1 sheet drawings

CLIENT'S LETTER

The following letter from your Client has just arrived:-

When we met recently I mentioned to you that I am always on the lookout for new items for my line of pre-packs of small hardware for DIY stores.

In recent years the long-established interior building finish of a brick wall coated with 10 to 20 millimetres of plaster has been replaced with dry-lined block walls where plasterboard sheets are supported spaced from the block wall and then coated with a thin (about one millimetre) plaster layer to complete the finish.

This new interior finish has led to the development of new fixing devices more appropriate than the conventional drilled hole and inserted fibre or plastic plug. I have such a new fixing device in my line of pre-packs. This is the device for which you recently secured patent protection.

While on holiday in Canada recently I passed a shop being refitted and, out of curiosity, stopped to watch. The fixing devices struck me as unusual and the shopfitter kindly gave me a couple of the devices and an empty carton. While in Canada I contacted the maker of the device from the carton details and discussed possible co-operation for the UK and Europe. Since my return I have reached a point in the discussions where I could import or even make the devices here on satisfactory financial terms.

However I sense that my approach has suggested to the Canadian manufacturer the possibility of a direct entry to the UK and European market, by-passing me, particularly if I do not respond favourably in the next two weeks.

I understand that the devices have been sold in Canada for over two years but that no attempt has been made to patent the device, possibly because of an existing US Patent, an extract from which I enclose. It occurs to me that my patent may cover the Canadian device as well as my own. I recall that the Patent Office raised objections to my patent based on an earlier but in my view unrelated device. Nonetheless you told me that you had had to restrict my patent.

Please advise me where I stand if:

1: I agree to market the Canadian device in UK

2: the Canadian device is marketed in the UK by the maker.

I enclose a leaflet from the maker about the Canadian device.

Please reply in the next day or so as I need time to consider the position before I reply within the two week deadline.

-- oOo --

You check your file on the Client's patent (Document A) and find two citations (Documents B and C); the US Patent extract is Document D, the leaflet is document E.

The Clients European patent has just passed the end of the Opposition period and is in force in the UK. Advise your Client.

DOCUMENT A

CLIENT'S PATENT

EUROPEAN PATENT NO. 2 500 000

BASED ON:- GB APPLICATION 93/15 000 OCTOBER 1993

PCT APPLICATION 94/20 000 SEPTEMBER 1994

DESIGNATING ALL EUROPEAN PATENT TERRITORIES

PUBLISHED AS WO 95 000 APRIL 1995

GRANTED WITH GB DESIGNATION JANUARY 1997

FASTENER ANCHOR

This invention relates to fastener anchors for fixings in sheet material and walls, partitions and similar structures including sheet material. Such fastener anchors are commonly called cavity anchors as they are widely used on plaster board structures for permanently and reliably supporting substantial loads without the need to be located on to supports behind the sheet.

Fastener anchors for such usage of various types are known. Among these are anchors which are put through an existing hole in the sheet material into a cavity where some alteration or deformation of anchor shape is caused to trap the anchor to the material so that the anchor can retain a screw or the like fastener to the sheet material and in turn hold an object in place on the material. Other anchors are known which have a cutting part on the distal end to first cut away material to form the hole before the rest of the anchor enters the hole. The anchor can have a bore for a fastener and a head to receive a screwdriver bit to drive the anchor.

All anchors of the type described above require a hole to be made as first step. If the hole is first made with a separate tool, such as a drill, an operative then has to carry out a second distinct step by inserting the anchor to produce the fixing. Where the anchor has a cutting part on the distal end, so that in one operation a hole is formed and then the rest of the rest of the anchor enters the hole; the cost of the anchor is increased. This type of anchor is of metal while being easily breakable so that a fixing screw can dislodge the cutting part once the anchor is installed. Anchors which form a thread in an existing hole or hole made by an integral cutting part distort the sheet material out of the sheet. Similarly a cylindrical root causes substantial disturbance of the sheet material axially of the anchor.

DOCUMENT A

It is an object of the invention to provide a cavity fastener anchor which does not have such shortcomings.

According to the invention there is provided a one step hole and thread forming, twist-driveable hollow-wall or cavity fastener anchor including a thread and a bore to receive a fastener.

The anchor has a body which may have at one end a piercing tip and at the other end a driving head. The thread is supported on a root which may be tapered. The thread may be tapered. The thread may have a cutting edge near to the tip and is preferably tapered throughout its length. There may be a gap between the thread and the driving head. The head may be bigger than the thread. Conveniently the tip is formed as a spike extending from the body.

According to a further aspect of the invention there is provided a method of installing an anchor in sheet material including providing an anchor comprising a pointed, headed body with a tapered root supporting a thread thereon and forcing and turning said pointed body against sheet material at an anchorage position to drive said anchor into the sheet material to consolidate material as a threaded hole, whereby an anchorage is produced in a single operation.

The anchor is made from plastics material chosen to meet various requirements. Firstly the plastics material must be strong enough to support the action of a screwdriver engaged with the head to drive the anchor. Secondly the plastic material must be strong enough to "cut" into the sheet material. Thirdly the plastics material must be soft enough in the bore for a fastener inserted into the bore to make a suitably retaining thread and load support. The anchor is conveniently of plastics such as ABS or a hard nylon, and formed by injection moulding. The head is conveniently shaped to receive a cross-point driving bit. However other bit-forms may be provided for either the simple blade or the more specific types now in use. A bore in the body is sized to receive a No.6, approximately 3.5 millimetre, screw of wood screw, chipboard, SPEED DRIVE (TM) or other suitable type. The thread need not reach the head, a gap of about one millimetre is convenient.

A preferred embodiment of the invention will now be described with reference to the accompanying drawing of a fastener anchor (Fig. 1) and a representation (Figures 2a, 2b, 2c) of the installation in sheet material of an anchor as shown in Figure 1.

It is seen from Figure 1 that the anchor has a body, indicated generally at 10, having a root 12 tapering from a piercing tip 13 to a driving head 11 and a tapering thread 14 thereon. The

thread 14 can start with a rapidly rising cutter edge at position 18.

By producing the anchor with the deeper, tapering thread and tapering root form shown an effective anchor is produced. Figures 2a, 2b, 2c show three stages in the installation of an anchor in a sheet of plaster board 20, followed by the insertion of the fastener 22; using a conventional screw driver 23. The anchor when driven screw-wise into a sheet of plaster board does not cause significant displacement of material outward of the sheet in the axial direction (Figures 2b, 2c). It is believed that the material is consolidated (as shown at 21) by movement radially of the anchor, which movement might be described as a "flow". To ensure a quick and accurate drive of the anchor a tip 13 is provided, preferably as a spike or other sharp extension. If required a mark can be made breaking the surface of the sheet material to aid the starting of the anchor drive. Such a mark is often made when setting out the positions for anchors so no extra action is needed. With a suitable "spike" tip the anchor can be driven by pressure into an unmarked surface.

It is believed that the thread depth about one-third of the local root diameter of the anchor provides the most effective form, thereby allowing installation of the anchor in a single operation.

In a specific example the anchor has an overall length of about 35 millimetres, the head 11 is about 13.5 millimetres in diameter and about one millimetre thick with a chamfered lower edge. The root 12 tapers from a point at tip 13 to a diameter near the head of about 7 or more millimetres while the thread 14 tapers through its length from the initial amount 18 (which may be from nothing to a significant edge as a cutter) just back from the tip 13 to have an overall diameter of about 12 millimetres. There is a gap 15 of about one millimetre between the thread and the head.

In the anchor of the present invention the root is 60% of the overall diameter compared with the 80% root diameter of conventional screws, and the thread is of coarser pitch. The anchor has a recess 17 to receive a cross-point driving bit 24, as shown in Figures 2a and 2b, and a bore 16 to receive a fastener 22, as shown in Figure 2c. The bore for this size of anchor is sized to receive a No.6, approximately 3.5 millimetre, screw of wood screw, chipboard, SPEED DRIVE (TM) or other suitable type.

An anchor about 35 millimetres long is suitable for plasterboard of some 10 millimetres to 20 millimetres thickness. Thus one size of anchor is suitable for both the common plaster board thicknesses. Other driving bit forms may be provided for, e.g. the simple blade or the more specific types now in use.

DOCUMENT A

The head of the anchor can be formed to have a part extending radially of the anchor root which is of the same thickness as a typical plaster finish coat (about one millimetre) now commonly used to "skim" dry partitions and wall surfaces. Thus when the anchor is driven to a stop in the sheet material (Figure 2c) the head 11 does not enter the sheet material but does become flush with the surface of the "skim" finish coat (not shown), producing a tidy effect and appearance. In particular the absence of disturbance of the structure of the sheet material by the anchor enhances the usefulness of the anchor.

The form described above, using a thread of substantial depth and a taper, is considered to be a significant feature in the effectiveness of the anchor compared to the other forms tried and found to be ineffective. An anchor where the thread starts at the very extremity, while starting effectively, can "wander" or tilt and cause the anchor to be misplaced in the sheet material.

The anchors described can be reused. The use of a controlled torque to drive the anchors is advantageous to avoid damage to either anchor or sheet material by overdriving while ensuring a tight fixing. Clearly anchors of various size can be made to suit various fasteners, even large ones such as coach screws.

The use of a wholly plastic anchor avoids the risk of damage to cables, metal pipes and thin metal cable capping or that of electrical conduction. The anchor is however strong enough to penetrate the plaster "dabs" sometimes used to fix plaster board.

The techniques described above provide an effective, economic cavity anchor which is quickly and easily installed to provide a strong anchor for a fastener for many duties. Typical of these in structures using plaster board for walls are the fixing of radiators, handrails, cupboards and other items requiring a secure fixing which copes with loading stresses.

DOCUMENT A

CLAIMS

1. A hollow-wall or cavity fastener anchor characterised in that the anchor is one step hole and thread forming, twist-driveable and includes a thread [14] and a bore [16] to receive a fastener.
2. An anchor according to Claim 1 characterised in that the anchor comprises a body [10] which supports the thread [14] on a root [12] over at least part of the length of the body.
3. An anchor according to Claim 1 characterised in that the body [10] includes a tapered root [12] for the thread [14].
4. An anchor according to Claim 2 or Claim 3 characterised in that the body [10] includes at one end a piercing tip [13] and at the other a driving head [11].
5. An anchor according to Claim 4 characterised in that the thread [14] runs from the driving head [11] to near the piercing tip [13].
6. An anchor according to Claim 4 characterised in that the thread [14] includes a cutting edge [18] near the piercing tip [13].
7. An anchor according to any one of Claims 4 to 6 characterised in that there is a gap [15] between the thread [14] and the head [11].
8. An anchor according to any of the preceding Claims characterised in that the thread [14] is tapered.
9. An anchor according to Claim 8 characterised in that the thread [14] is tapered along the whole of its length.
10. An anchor according to Claim 4 characterised in that the head [11] has a chamfered edge to level with a skim plaster coat.
11. A method of installing an anchor in sheet material [20] including providing an anchor comprising a pointed [13], headed [11] body [10] with a tapered root [12] supporting a thread [14] thereon and forcing and turning said pointed body against sheet material at an anchorage position to drive said anchor into the sheet material to consolidate material [21] as a threaded hole, whereby an anchorage is produced in a single operation.

Document A

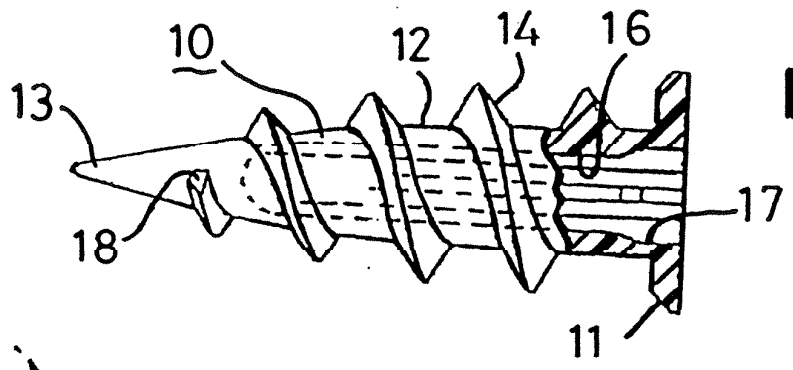


FIG.1

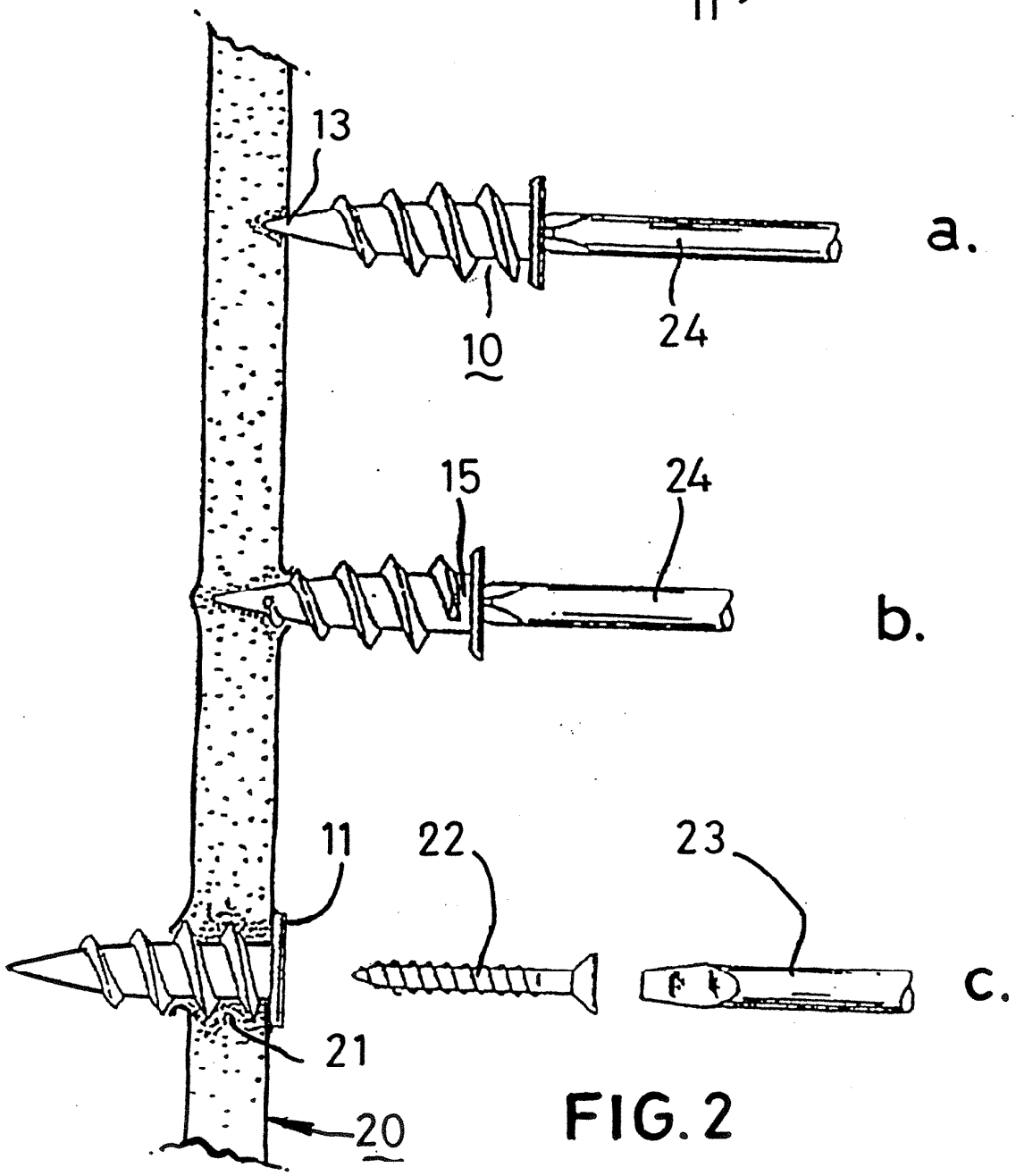


FIG. 2

DOCUMENT B

EXTRACT FROM D-I-Y NEWS - PUBLISHED JULY 1993

"RECENT DEVELOPMENTS IN DRYWALL ANCHORS"

The growing use of drywall construction techniques has stimulated development of several new devices for producing anchorages for fasteners such as screws so that light-fittings, pictures, electronic equipment and pieces of furniture such as small cupboards and bathroom cabinets can be installed. Such devices must be as cheap as possible and quick and easy to use. One recent development is described here.

Figure 1 is a side elevation of the drywall anchor, Figure 2 is a front elevation taken from the right side as shown in Figure 1, and Figure 3 is a partially sectioned side elevation showing the anchor installed in a section of drywall.

The anchor shown here is moulded from zinc and has a cylindrical body 11 on which is a high thread 17. There is a flange 29 at one end of the body and a flat drilling blade 19 at the other. An axial bore 25 goes through body 11 to a spoon-like opening 23 in the blade 19. Thread 17 is separated from the flange 29 by the space 27. The axial length 13 of the threaded portion of the cylindrical body is usually the same as the axial length 15 of the drilling blade 19. The thread 17 has one or more notches 20 to form generally radial surfaces 24 bounded by cutting edges 21. Where the threaded portion meets the drilling blade weakening slots 45 facilitate the lateral deflection of the blade 19 when a threaded fastener is driven through the insert, the spoon-like opening 23 forming a curved wall 35 which guides the tip of such a fastener. The blade 19 has a central spike 31 at the extreme end which extends beyond peripheral spikes 33.

The insert has a PHILLIPS (RTM) head formed by four slots 37 in the bottom of the recess 39 in the upper end and can be screwed into position by hand using a PHILLIPS screwdriver. The spike 31 maintains the location of the insert during drilling, while the spikes 33 neatly cut the paper covering which is used on the surface of a drywall. The spikes 31 and 33 continue to cut a hole in the drywall as the anchor is rotated to complete the drilling operation after which the thread 17 begins to cut a mating thread in the drywall material; the cutting edges 21 assist in cutting the thread in the drywall.

The interior of the bore 25 has splines 40 whose height and shape depend on the hardness of the material comprising the insert and the crest diameter of an associated threaded fastener.

Figure 3 shows the threaded insert as it appears when fully installed. The threads 17

of the insert are engaging the drywall 42. The upper surface of the flange 29 is flush with the outer surface 43 of the drywall 42. This flush condition is obtained by the use of a low profile head 29 and by the presence of the space 27. The discontinuation of the thread 17 before reaching the head 29 creates a space in the thread form in the drywall material which allows compression of adjacent material by the flange 29, and which, therefore, allows the uppermost surface of the flange 29 to be flush with the outer surface 43 of the drywall.

Figure 3 shows how the insertion of the threaded fastener 50 through the insert causes the blade 19 to deflect laterally. As the drilling portion is deflectable a screw of a predetermined length can be used regardless of the thickness of the material 44 being fastened.

The break-off nature of the blade 19 gives another advantage. When drywall is placed over much harder surfaces such as concrete or cement block there is often only a small amount of space, generally less than 3/4", between the back of the drywall and the surface of the supporting structure. In this situation the insert is used as above to cut a hole in the drywall. The insert is then removed and the blade 19 broken off at the location of the weakening slots 45. The insert is then threaded into the drywall 42, without any danger of the blade 19 contacting the supporting structure.

Document B

FIG.1

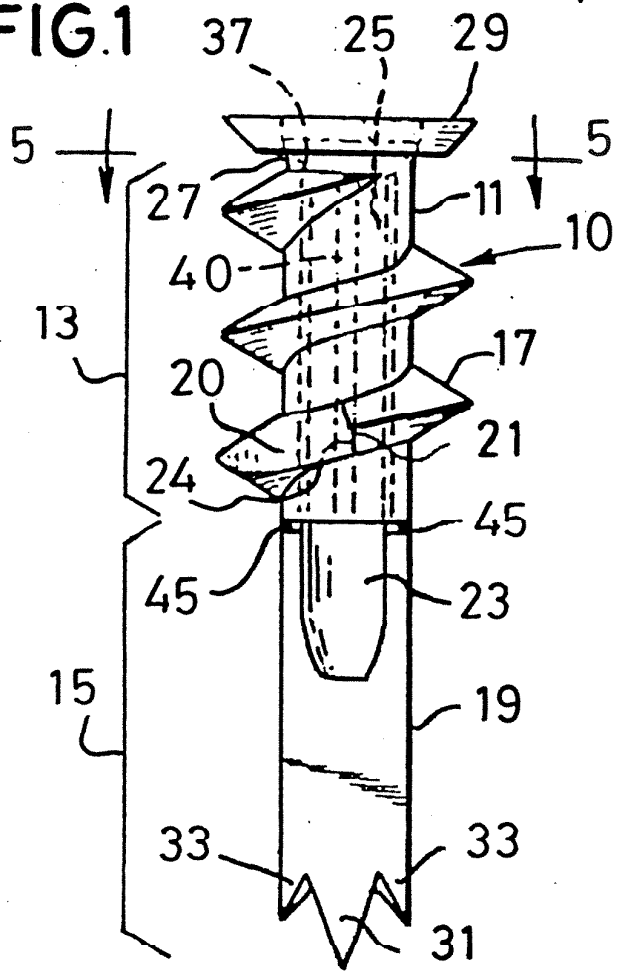


FIG.2

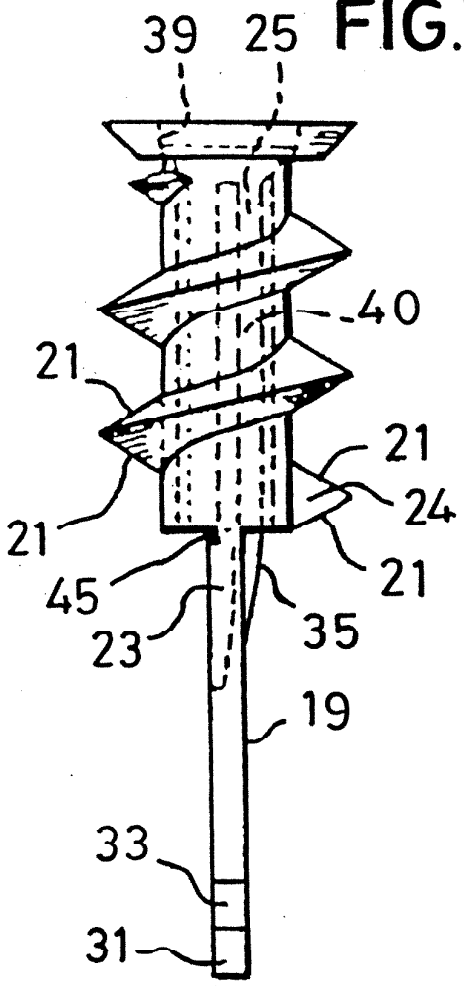
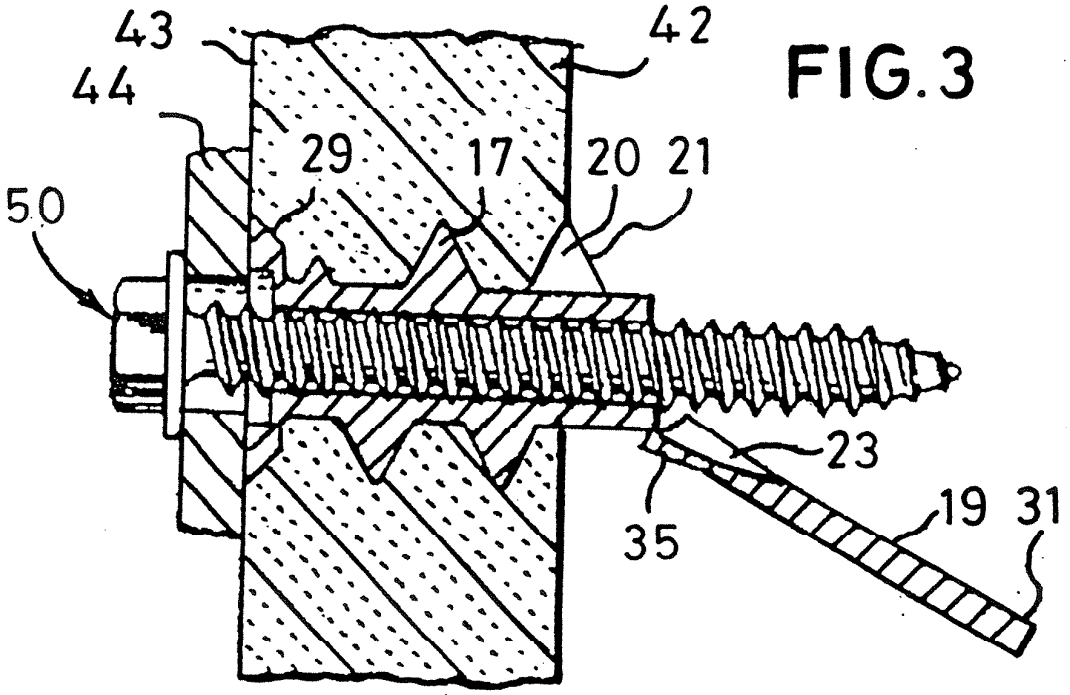


FIG.3



DOCUMENT C

EUROPEAN PATENT NO. A1 300 000 - EXTRACT

APPLICATION AUGUST 1993

PUBLICATION FEBRUARY 1995 DESIGNATING ALL TERRITORIES

ABANDONED AFTER PUBLICATION

The present invention relates to an insert, and particularly to an insert for use in drywall or sheet rock construction. Because drywall is a friable gypsum based material, fastening articles to it is difficult. Generally for light weight articles plastic expansion anchors are commonly used. Such anchors require three steps to install them. First, a hole is drilled into the drywall. Secondly the insert is pushed into the hole. Finally, a threaded fastener is advanced into the anchor spreading the anchor into engagement with the drywall. Typically such anchors include a generally hollow cylindrical body with a flanged end. For heavy duty applications, toggle bolts are generally used to attach articles to a drywall. While toggle bolts are generally effective, they are also generally expensive.

According to this invention the body of such an anchor has an exterior thread and a cutting end, the cutting end including means for allowing passage of an elongated fastener through the body and beyond the cutting end.

The present invention avoids a separate cutting operation and provides an anchor which is simple to install and inexpensive to manufacture. It also has improved pullout resistance compared to light duty plastic anchors, and is significantly cheaper and easier to install than toggle type anchors.

Preferably the cutting end has a maximum lateral dimension substantially equal to the root diameter of the threaded portion, and the crest diameter of the threaded portion is preferably substantially twice that of the root diameter. These two features are important to achieve a proper threaded connection in the drywall. Because drywall is made of a weak friable material, a high thread is needed to transfer pullout forces to as much of the material as possible. The cutting operation removes only as much material as is necessary, leaving behind a maximum amount of work piece material for thread engagement.

A distinct advantage of the insert of the present invention is that these two operations can be performed in a single step without the need to pre-drill a hole in the drywall with a separate tool. The threaded and cutting portions are preferably generally equal in length to each other, and are generally equal in length to the thickness of standard drywall material. Alternatively, the thread may extend to near the cutting end.

DOCUMENT C

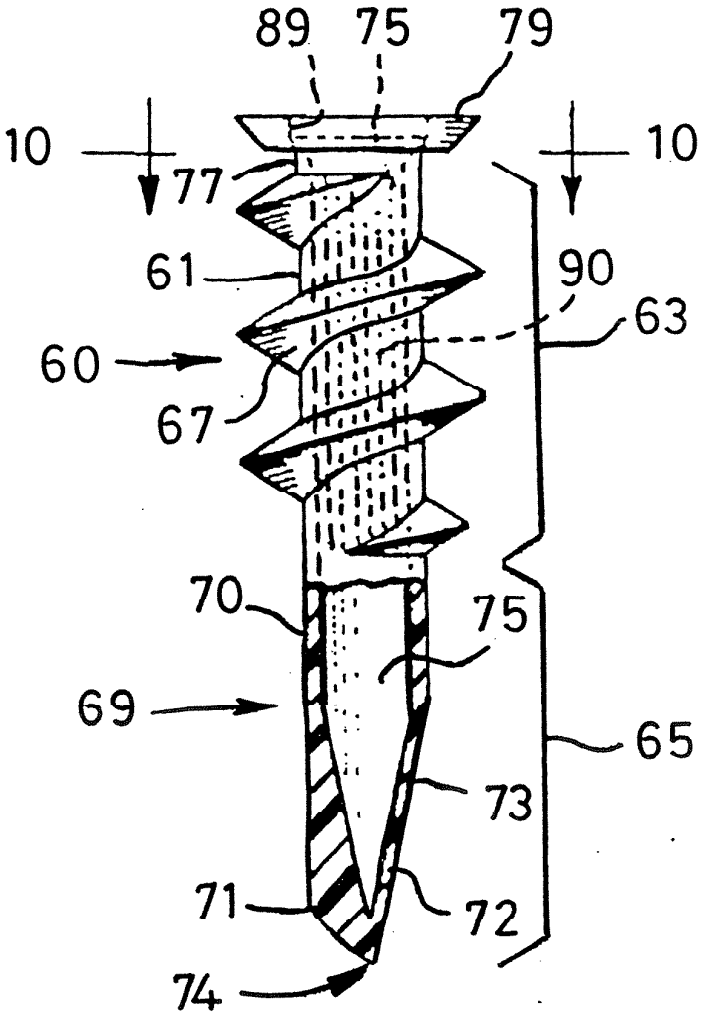
An embodiment of an anchor in accordance with this invention will now be described with reference to the accompanying drawing, which is a side elevation of a drywall anchor,

The drawing shows a plastics moulded threaded insert 60 of a generally cylindrical body 61 supporting an external thread 67. An elongated cutting tip 63 is formed at one end of the body and a low profile flange 79 at the other end. The thread 67 stops before reaching the flange 79, forming an unthreaded neck 77. The length 63 of the threaded portion is generally equal to the length 65 of the cutting tip 69. A bore 75 extends from the flanged end of the insert into the cutting tip 69. The flanged end 79 includes a recess 89 and slots to receive a PHILLIPS (RTM) driver. The cutting tip 69 is comprised of a conical point 74 and a flat surface 72. A web 73 closes off the bore 75, and prevents dust from entering the bore during the cutting operation. There are splines 90 on the interior of the cylindrical body 61 for engagement by a fastener. Since the anchor is of plastics material in this example, the splines 90 may be thicker and more numerous than if the anchor was of metal, as most plastics are softer and more easily tapped than moulded zinc, which would be a typical choice of metallic material.

When the anchor is in its installed position in a drywall the threads 67 engage the drywall material and the flange 79 is flush with the outer surface while the cutting tip 69 allows axial penetration of a fastener. The threads of the fastener engage the splines 90. When the article to be fastened is thin the tip of the fastener can penetrate the web 73 causing lateral deflection of the tip 69. However, a thicker article could be fastened with the same fastener which then may not penetrate the web 73.

Document C

FIG. 1



DOCUMENT D

UNITED STATES PATENT NUMBER: 4,000,000

DATE OF ISSUE : JAN. 6, 1993

ROOF ANCHOR AND STRESS PLATE ASSEMBLY

This invention relates generally to an anchor and stress plate assembly for securing an insulation layer to the deck of a roof, and more particularly to an assembly of this type whose anchor enters decking material but does not penetrate the underface thereof.

Background of Invention

Conventional anchor and stress plate assemblies usually make use of anchors of the toggle type which penetrate the material so that the stress plate engages the upper face of the insulation layer while the toggle engages the underside of the deck. A serious practical shortcoming is that the toggles tend to loosen up as a result of vibratory or other forces, and sometimes in doing so cause debris to fall into the interior of the building, while the anchor may in time fail and result in a blow off of the insulation layer.

Summary of Invention

The main object of this invention is to provide an improved roof anchor and stress plate assembly of the non-penetrating type for securing a layer of insulation to a deck composed of relatively soft or hard material.

Thus there is provided an anchor and stress plate assembly for use in either relatively soft or hard material, said anchor comprising a head and a shank having a section of predetermined length constituted by a screw terminating in a tip at the end of the shank, said screw being defined by a root which tapers toward the tip along substantially the full length of the section and a threading formed by a series of convolutions whose crests are essentially the same diameter along substantially the full length of the section except for the convolutions thereof adjacent the tip including a final convolution in the series.

The anchor is provided with a flanged head and a shank whose leading section takes the form of an auger screw having a root which tapers toward the tip and a threading about the root whose crests are of approximately uniform diameter. When the anchor is turned into soft decking material, the tapered root of the auger screw then acts to pack this material into a dense mass in the region surrounding the screw to enhance the holding power of the anchor. In hard decking material, a hole must first be drilled therein to receive the auger screw whose root when the anchor is turned in fits within the hole and whose crests then cut a thread in the

hole wall to securely retain the anchor.

The stress plate overlies the insulation layer to prevent uplift.

Brief description of Drawings

Fig. 1 is a perspective view of the anchor according to the invention,

Fig. 2 is a section taken through a layer of insulation secured to a deck of soft decking material in which the assembly is installed and

Fig. 3 is an enlarged view of the tip portion of a modified anchor.

Detailed Description of the invention

Fig. 1 shows an anchor 10 included in a roof anchor and stress plate assembly, anchor 10 being moulded or otherwise fabricated from a synthetic plastic material of high strength such as glass-reinforced nylon or cast of a corrosion resistant zinc alloy or other suitable material.

Anchor 10 includes a generally-cylindrical head 11 having at diametrically-opposed positions thereon flattened sides and a pair of fingers 12 and 13 which cantilever over the respective flattened sides in opposing angular directions. Head 11 has an integral circular flange 14 of larger diameter than the head. An axial bore extending through flange 14 and head 11 has a hexagonal socket 15 for receiving a similarly-shaped bit of a torque-producing tool for turning the anchor. Alternatively the anchor flange may be provided with a slot or slots to receive the blade of a screwdriver, such as a PHILLIPS (RTM) screw driver.

Anchor 10 includes a shank whose leading section takes the form of an auger screw having a root 16 which tapers toward the tip 17. Spiralled about root 16 is a threading 18 whose crests are of approximately uniform diameter throughout the length of the leading section except for the crests adjacent tip 17,which are of smaller diameter to facilitate entry of the auger screw into the decking material. The trailing section 19 of the shank has a length appropriate to the thickness of the insulation layer to be secured to the deck and is of uniform diameter and unthreaded.

Fig. 2 shows the assembly installed to secure a layer of insulation 25 to the surface of a deck 27 formed of soft decking material. For installation the stress plate 20 is placed over readily penetrable insulation layer 25 and anchor 10 is then pushed through until the tip 17 of the anchor impinges on the surface of the decking material. At this point it becomes necessary to turn the auger screw section of the anchor into the decking material until is fully turned in. Its head 13 then lies within the opening in stress plate 20, with the flange 14 then resting on the depression 22 so that the flange does not protrude.

DOCUMENT D

When turning the auger screw into deck 27 the soft decking material, which is usually a wood-fiber composite of relatively low density, is packed by the threading of the screw into a dense mass 28 which surrounds the screw and acts to improve resistance to withdrawal of the anchor. Such packing results from the geometric relationship of the tapered root 16 of the auger screw section to the crests of the threading which are of approximately uniform diameter. As the screw advances, the decking material in the region surrounding the relatively small diameter root at the lower end portion of the auger screw is progressively compressed which gives rise to an increased density in the decking material while keeping to a minimum the rupturing of the fibrous elements thereof and thereby maintaining the integrity of the material. The densified mass of soft decking material in the region surrounding the auger screw results in a significant increase in holding strength. This advantage is lacking in an ordinary auger screw.

Figure 3 shows the tip portion of a modified anchor according to the invention in which the final convolution 18F of the helical threading ends abruptly in a sharp cutting edge 18C which extends laterally from the root adjacent tip 17, preferably with a chisel-like formation. When this anchor is turned into a screw-resistant substrate cuts into the substrate to facilitate entry of the screw; obviating the need for pre-punching or pre-drilling a screw entry hole.

An anchor in accordance with the invention has practical applications apart from those disclosed herein, and the anchor need not be used with a stress plate. The anchor is usable to secure panels of various types to side walls or other structural members.

Document D

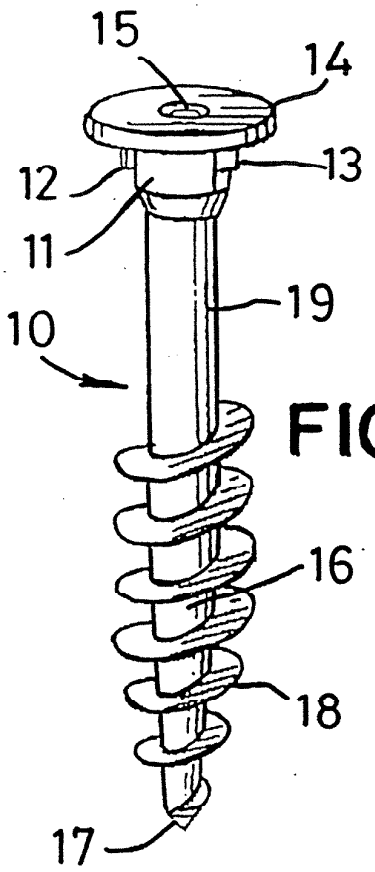


FIG.1

FIG.3

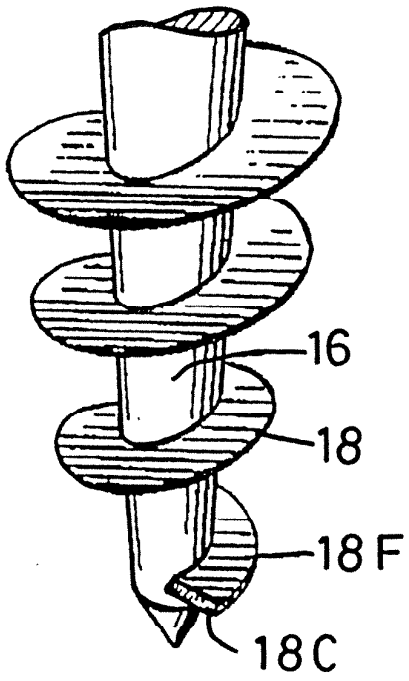
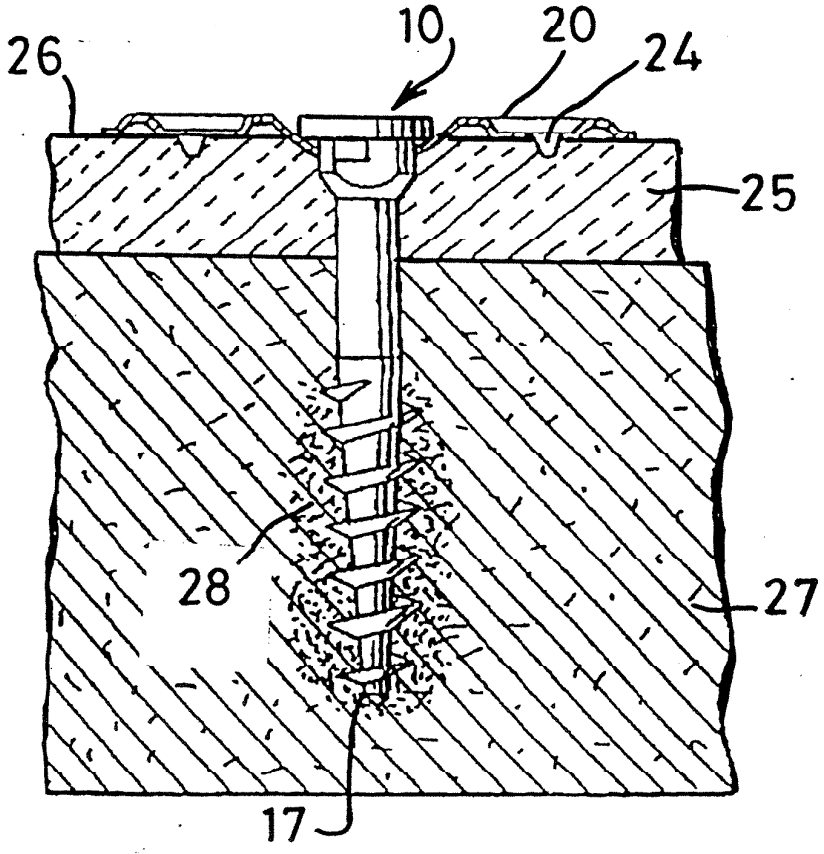


FIG.2



DOCUMENT E

PUBLISHED IN CANADA - OCTOBER 1995

PRODUCT TECHNICAL INFORMATION LEAFLET A501

Plug-Type Anchors

FIGS. 1, 2 and 3 show an anchor of a screw-in plug type formed of metal or molded of high-strength, synthetic plastic material such as nylon or polypropylene. This plug-type anchor, identified at 31, is screwable into a substrate 32 which may be plywood, plasterboard, fiberboard or any other material used in hollow wall construction and is available in a range of sizes.

Anchor 31 is provided with a tapered body 33 that terminates in a drill tip 34. Body 33 defines the tapered root of a screw having a helical threading 35, the crests of whose convolutions are of approximately uniform diameter along substantially the full length of the body except for convolutions adjacent tip 34. The final convolution, as it approaches tip 34, decreases in diameter until it attains nearly the diameter of the root at the point where it merges with the root. The head of the anchor is defined by a collar 36 having a truncated conical form, the collar being flush with the face of the substrate when the anchor is fully screwed therein. The relationship of the tapered root to the threading whose crests are of approximately uniform diameter is such as to cause packing of the substrate material to produce a densified mass in the region surrounding the anchor body to resist withdrawal of the anchor. Although not shown in FIGS. 1 to 3, in practice the final convolution of the threading surrounding the tapered root may be formed to end abruptly in a chisel-like cutting edge to facilitate entry of the screw-type plug into the substrate.

The anchor is provided with a longitudinal bore 37 adapted to receive a mounting screw 38 having a head 39. This screw serves to hold a bracket 40 or any other fixture having a mounting hole 41 therein through which the mounting screw passes. When the mounting screw is fully turned into the anchor bore, its head then engages the bracket. In practice, the mounting screw may be self-tapping; but if the anchor is intended for a machine screw, the bore 37 in the anchor is internally threaded to receive this screw. Body 33 of the anchor may be longitudinally slit so that as a mounting screw 38 is screwed therein, the anchor is caused to expand to more firmly secure the anchor in the substrate. In this instance, the diameter of the screw exceeds that of the bore so that as it is screwed therein it forces the body of the anchor outwardly.

The hollow interior of the body or of the collar is provided with a cruciform slot or other shape so as to receive a torque-producing tool 42, as shown in FIG. 2, such as an electric screw driver with a PHILLIPS (RTM) bit. With this tool, the anchor thereby is rotated to cause the anchor tip 34 to drill a lead hole in the substrate, the anchor then threading itself into the substrate until it comes to rest with its collar 36 lying flush with the face of the substrate. Bracket 40 or whatever other fixture or device to be fastened is then placed with its mounting hole 41 in registration with anchor bore 37.

Mounting screw 38 is then inserted in the mounting hole of the bracket and screwed into anchor bore 37 to secure the bracket to the face of the substrate. This action may be carried out using the same electric screw driver and bit for this purpose that was used to install the anchor.

Thus by means of the self-drilling anchor of the screw-plug type, the torque producing tool used to install the anchor serves also to screw the mounting screw into the installed anchor, thereby making possible a fast and economical installation procedure.

Another significant advantage of this plug-type anchor is that should it become necessary to take off the fixture fastened to the substrate and also to remove the anchor from the substrate, this is readily accomplished by first removing the mounting screw 38 to release the fixture, and then screwing out the anchor from the substrate, the same tool being used for both actions.

In the plug-type anchor shown in FIGS. 1 to 3, the length of mounting screw 38 must be appropriate to the length of bore 37 in the anchor plus the thickness of the fixture to be fastened to the substrate. In order to avoid this specific requirement and make it possible to use the anchor with mounting screws of various lengths, the plug-type anchor shown in FIG. 4 is provided with a notch 43 which communicates with bore 37' at the point where the bottom of the bore is adjacent drill tip 34', this tip being partially cut away to create an exit for a mounting screw passing through the bore.

In this way should the length of the mounting screw used to fasten the fixture exceed a length representing the sum of the thickness of the fixture and the length of the bore, the mounting screw will exit through notch 43. Thus, the user is not required to use a mounting screw of predetermined length, but may use mounting screws having lengths which more or less exceed the predetermined length yet serve the required function.

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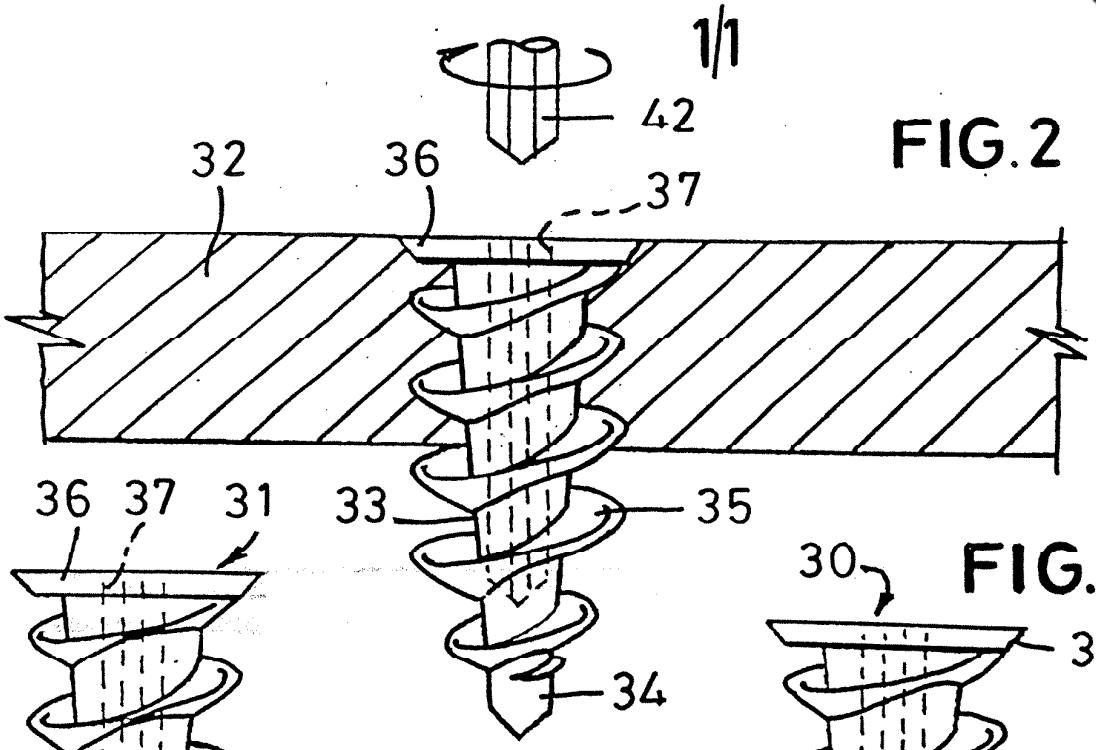

FIG.2

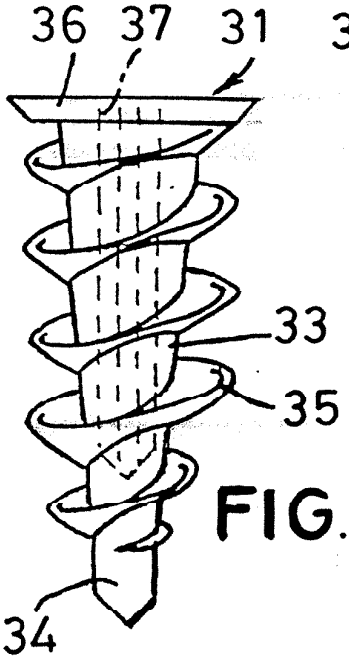

FIG.1

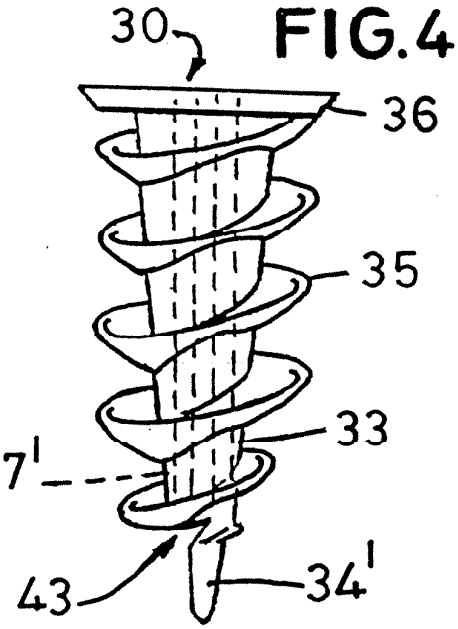

FIG.4

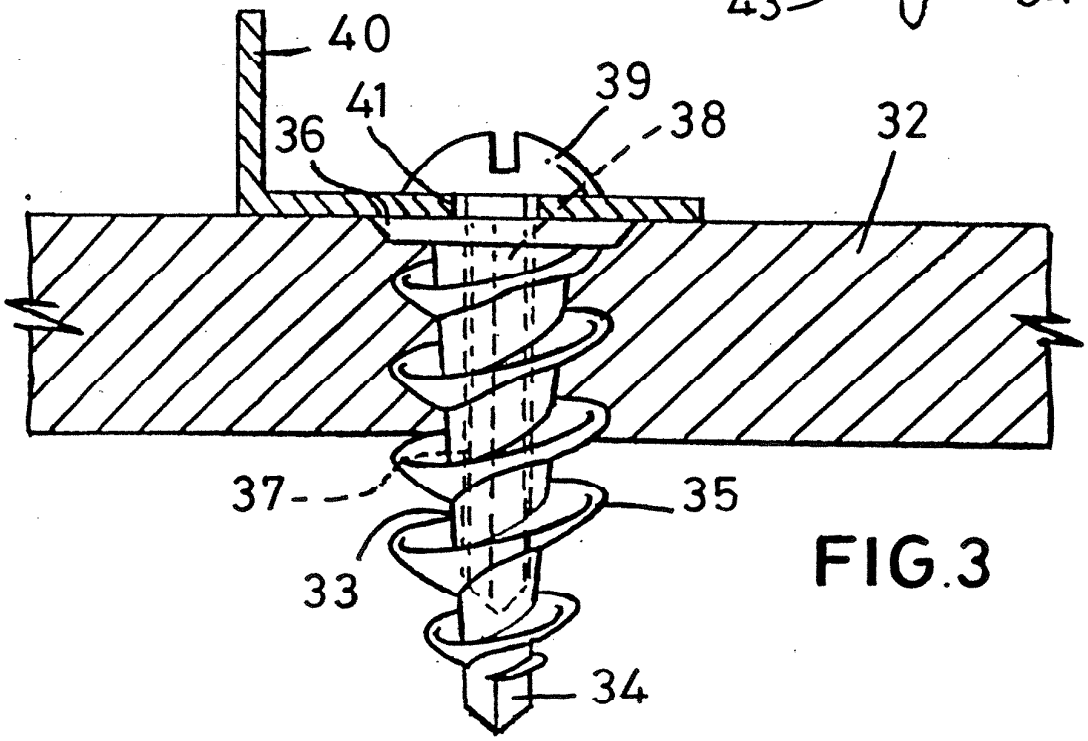

FIG.3